Production and productivity in the farm and factory sectors are looking up, but the Indian economy is still in the woods, due to inflationary traps, supply bottlenecks especially of infra-structural facilities and trade gaps etc. While industrialised countries can grow without let up or hinderance despite inadequate expansion of agricultural sector, shortages being made up by imports from other countries, the situation is different in a country like India.

In recent years, role of agriculture in the process of growth of Indian economy is highlighted as the largest contributor to domestic output and as the absorber of the largest proportion of labour force. In fact, the overall growth performance of Indian economy is determined by the growth of agriculture. If the growth of agricultural output is high, the whole economy gathers momentum and becomes buoyant and whenever agricultural output has shown signs of decline or even stagnation, the whole economy slides down. Massive efforts of industrialization notwithstanding (34), but in the present situation, what is far more germane to the process of growth is to increase marketed surplus out of increased production. There is need to expand internal market for food-surplus.
Marketing of agricultural produce is the crux of our rural economy of our country. Marketing is not only the final act in a series of agriculturists’ operations, but the one which governs and directs every activity throughout the year. In fact, sweat is of the middleman and sweat goes to agriculturist. Farmers, in developed countries, sell a large amount of the produce after keeping a small part of it for their self-consumption. While situation is reverse in under-developed countries like India. In such countries, farmers sell only that part of the produce which will provide them sufficient cash. In a situation of this type, consumption is treated as a residual. In developed countries, savings are mostly in the form of cash due to commercialization of agriculture and monetization of the economy, while in developing countries, farmers feel safer with savings in mind. This is due to uncertain weather conditions.

Our sample of study is comprised of small and middle farmers, while large farmers constitute microscopic minority in the sample. Cash requirements of small and medium farmers determine the size of marketable surplus. With a rise in the prices, they sell less and with a fall in prices, they sell more in order to fetch requisite cash for their needs. Due to fixity of cash-requirements, there exists an inverse relationship between marketable surplus and prices. Thus, this inverse relationship makes
the short-run supply curve backward bending.

Output and income happen to be other determinants of marketable surplus. Relationship between output and marketable surplus is important from the point of view of policy. With the increase in output and rise in prices, farmers sell less because this enables them to get required cash and vice-versa. With the fall in output and fall in prices, they have to sell more while suppressing their own needs. So with the increase in output, they satisfy their pent up demand. This is, by and large, true about marginal and small farmers. Normally, there occurs a positive relationship between marketable surplus and output; marketable surplus and income. We expect the same behaviour pattern of farmers in case of Harvana. In this chapter, an attempt is made to estimate elasticity of marketable surplus.

DATA SOURCES AND ADJUSTMENTS:

We have studied the same five commodities: all food-grains, wheat, rice, maize and pulses. Data for these commodities have been collected from "Farm Accounts of Haryana Cultivators" and "Family Budgets", some thirteen families have been selected for the study. Data have been collected for six years which extend from 1970-71 to 1975-76.
The quantum of sales to market depends upon farmers' own needs for human consumption, seeds, cattle feed and stocks etc. Due to non-availability of data about stocks, we are using the concept of marketable surplus. As the data about marketable surplus is not provided in the reports, so we have tried to estimate it in this chapter on the basis of the model which is discussed in Chapter (II). Marketable surplus has been estimated for five commodities. Marketable surplus of last commodity i.e. the marketable surplus of all food-grains has been estimated as a weighted average of marketable surplus of first four commodities and weights are proportional to the quantities sold.

(i) **Consumption:**

These publications contain the information about the farmers' consumption of different commodities both in physical as well as in value terms. With the help of such information, implicit prices have been estimated for each family for each year separately. Consumption in current prices is converted into the consumption in constant prices, with 1970-71 as base year. Then, the value of consumption at constant prices is divided by adult consuming male units in order to derive per capita consumption.
(ii) **Cattle-feed:**

"Farm Accounts" reports provide the information about the expenditure on per pair of bullocks and number of bullocks owned by each family in each year. Expenditure on a pair of bullocks in current prices has been converted into the value at constant prices with the same base year. In order to get the total expenditure on cattle-feed, we have multiplied the expenditure on a pair of bullocks in constant prices by the number of bullocks kept by each family.

(iii) **Seed-requirement:**

Farm Accounts' survey provides the information for the expenditure on seeds per hectare. This expenditure on seeds per hectare in current prices has been converted into the expenditure in constant prices, with the help of implicit prices of 1970-71. We made an assumption over here that only for wheat and rice crops HYV seeds are used. So in order to calculate total expenditure on seeds, area under two crops have been multiplied by constant price expenditure per hectare.

(iv) **Amount purchased from outside:**

Reports contain the information of those commodities which are purchased from the market only in money.
terms. Those money values are divided by the implicit prices of goods consumed in current prices. Then these physical quantities of goods purchased from market are converted into money terms in constant prices of 1970-71.

(v) Output:

These reports provide the detailed information about the output of twelve different commodities both in physical and monetary terms, with the help of which the implicit prices have been estimated for each family for each year separately. Physical quantities of output have been multiplied by implicit prices of 1970-71 for estimating output in constant prices.

Thus, marketable surplus has been estimated with the equation (26) in chapter II. Output, income and cash-requirements are taken as explanatory variables for estimating elasticities of marketable surplus with respect to these variables. Income from both the sources: farm and non-farm income is deflated by general price index with 1970-71 as a base year. This deflated income is divided by adult male consuming units, in order to derive per capita income.

(vi) Cash-requirements:

Farmers need cash in order to satisfy their needs. We have divided the cash requirements into two parts:
(a) Cash-requirements for consumption.
(b) Cash-requirements for production.

(c) Cash-requirements for consumption:

This includes the expenditure on those items which are being purchased from the market such as expenditure on food, fuel, clothing, housing, lighting, medicine, travelling, education, religion, social amusement and miscellaneous. Expenditure on food comprises of the expenditure on wheat, maize, milk and milk products, rice, pulses, sugar, oil and vegetable ghee, vegetables and fruits, salt and miscellaneous. These items of food consumed are partially purchased from the market and are partially self-produced. "Family Budgets" contain the information of items purchased from the market only in monetary terms, and implicit prices are estimated for each year and for each family separately. With the help of implicit prices, the physical quantities of different commodities purchased from outside are derived. Thus, it is impliedly assumed that total quantities of all the goods are evaluated in the same implicit prices irrespective of their source being the market or self-production. It is just an approximation in the absence of relevant information. These estimated quantities of items purchased from outside are converted into value terms in constant prices of 1970-71.
Domestic expenditure on items other than food is also converted into value terms in constant prices of the same base year. In order to derive marketable surplus, same year is taken as a base. Expenditure on clothing in different years is deflated by the wholesale price index of textiles; expenditure on medicine is deflated by the price index of drugs and medicines. Expenditure on lighting is deflated by the weighted price index of mineral oils and electricity, because it is not specified in the reports that expenditure is either on electricity or oils or on both the items. So average of both the indices is taken. Commodity composition of different items is not specified properly. So we have deflated the expenditure by general price index. Due to non-availability of the data on retail price indices of all the commodities, we have used wholesale price index. In order to calculate the total cash-requirements for consumption purposes, expenditure estimated in the above way on different items is added.

(b) Cash-requirements for production:

Another part of the total cash requirements is the demand for cash for production purposes. "Farm Accounts" contain the information about the expenditure per hectare both for irrigated and unirrigated areas separately. Cash-requirements for production are taken into account only of
those items which are partly or totally purchased from the market. Table relating to total expenditure per hectare consists of detailed information about expenditure on manual labour, bullock labour, artisans, implements and tools, fertilizers, seeds, water-rates, rents and land revenue and miscellaneous.

In the reports themselves, the expenditure incurred on hired labour, both casual and permanent hired labour is given. This total expenditure on labour is deflated by cost of living index for agricultural workers with 1970-71 as base year.

Expenditure on artisans is similarly deflated by cost of living index with the same base. Expenditure on water-rates, rent on land leased in and land revenue are estimated at the rates which were prevalent in 1970-71. Expenditure on fertilizers is given separately in the reports which is exclusive of the expenditure on manure which is largely produced on the farms. Expenditure on fertilizers is deflated by wholesale price index of fertilizers. Expenditure on seeds includes the expenditure on the type of seeds which are purchased from outside. It is assumed that only high variety of seeds are purchased from market for wheat and rice.
Expenditure on bullocks labour that enters into calculation of cash requirements consists of those items which are purchased from outside in order to maintain their bullocks. These items are such as oil cakes, oil, gur, oil seeds and salt. These are calculated at the prices of 1970-71.

Expenditure on implements and tube-wells has been calculated firstly by deducting two percent of agricultural income as depreciation charges from the total expenditure and then this expenditure is deflated by the combined index of machinery, electricity and mineral oil. Expenditure on other items is deflated by general price index as these are not properly specified in the reports. In order to calculate total cash-requirements for production purposes expenditure on all the items is summed up.

In order to estimate total cash-requirements for the farmers, two different types of cash-requirements are added. These cash-requirements are divided by adult male consuming units in order to derive per capita cash-requirements. In order to make all the variables comparable, these are adjusted for the general price index.

**Empirical Results:**

Marketable surplus has been regressed upon output, income and cash-requirements. All the variables are taken
in per capita items. It may be noted that prices have already been used as a determinant of consumption, which in its turn has been used for estimating marketable surplus. Therefore, all degrees of freedom that have been used with prices have already been exhausted. We can not use them again for estimating price elasticity of marketable surplus. Besides, price elasticity of marketable surplus is already available to us from equation (33) of the model. In order to know the association between marketable surplus and other independent variables, we have calculated compound rate of growth of different variables. All these variables in are calculated/per capita terms. Table (15) contains these results.

Rate of growth of cash-requirements is positive for all the families. The value of these rates of growth for all the families range between 1.13 to 2.17. Similarly, output has grown positively for all the families. Output of all food-grains has been considered. Thus, the range of rate of growth of agricultural production is 1.18 to 2.10. Dependent variable, marketable surplus has also grown positively for all the families. The rate of growth ranges from .82 to 2.09.

In order to examine the relationship between marketable surplus and independent variables, we have applied the sign test. Positive sign is allotted...
both the rates of growth are positively growing. Inverse relationship between price and marketable surplus implies that with the increase in demand for cash, marketable surplus tends to increase. So there exists a positive relationship between cash-requirement and marketable surplus. Table (15) shows that all the families have got positive signs for both the rates of growth. So these lend empirical support to the hypothesis of positive relationship between cash and marketable surplus.

Increase in output leads to increase in the income which reflects the higher level of development. This increased output is partially used for consumption purposes and it partially augments the sale for markets. Market-sales will increase only when cash-requirements are positively growing. Output for all the families is growing and similarly, the cash-requirements are also growing. Thus, all the families have got positive sign for both output and cash-requirements. It implies that increase in output/income induced the farmers to increase the demand for goods or invest the money in superior cultural practices. Here the assumption of fixity of cash-requirement is relaxed.

In the last column of the table sign test is applied to know the association between output and marketable surplus. All the families have got positive sign for both
these rates of growth. So there exists a positive association between the two. But the rate of growth of marketable surplus is less than output which implies that with the increase in output, consumption also tends to rise. Thus, these empirical results strengthen the hypothesis proposed by Krishnan (22) that Mathur-Ezkiel theorem can be derived while relaxing the assumption of fixity of cash-requirement.

Marketable surplus has been estimated by OLS method. Elasticities with respect to different variables have been estimated from time-series data for all the five commodities. Estimated elasticities are reported in the tables (10 to 14) and are discussed in detail in Appendix B.

Here we have tried to estimate the elasticities for marketable surplus with different variables from the panel data. Pooling is done while combining the cross-section and time-series data together.

Estimated equations with respect to cash-requirements, output and income are given below:

1. \( \log M_w = 1.270338 + 0.401699 \log K \)  
   \[ t \]  
   \[ R = 0.113565 \]  
   \[ (.99648) \]

2. \( \log M_R = -0.12962 + 0.53002 \log K \)  
   \[ t \]  
   \[ R = 0.100696 \]  
   \[ (.88233) \]

3. \( \log M_I = -0.20683 + 0.22045 \log K \)  
   \[ t \]  
   \[ R = 0.04784 \]  
   \[ (.41756) \]
4. \[ \log M_P = 1.09559 - 0.35595 \log K \]
   \[ t \]
   \[ R = 0.09459 \]

5. \[ \log M_P = 0.23095 + 0.883807 \log K \]
   \[ t \]
   \[ R = 0.34571* \]

II

(i) \[ \log M_W = -3.5399 + 2.2166 \log Q_W \]
   \[ t \]
   \[ R = 0.78473* \]

   \[ (11.03675) \]

(ii) \[ \log M_R = -1.14255 + 0.994111 \log Q_R \]
    \[ t \]
    \[ R = 0.6615056* \]

   \[ (30.50499) \]

(iii) \[ \log M_M = -2.7036 + 0.84251 \log Q_M \]
     \[ t \]
     \[ R = 0.72277* \]

     \[ (9.3877) \]

(iv) \[ \log M_P = -0.31434 + 1.05092 \log Q_P \]
    \[ t \]
    \[ R = 0.41948* \]

    \[ (13.60360) \]

(v) \[ \log M_P = -2.18825 + 1.71560 \log Q_F \]
    \[ t \]
    \[ R = 0.90644* \]

    \[ (11.88945) \]

III

(i) \[ \log M_n = 1.56842 + 0.25270 \log Y \]
    \[ t \]
    \[ R = 0.072407 \]

    \[ (632891) \]

(ii) \[ \log M_R = -1.20261 + 0.32121 \log Y \]
     \[ t \]
     \[ R = 0.158126 \]

     \[ (1.39608) \]

(iii) \[ \log M_M = -2.49982 + 0.954899 \log Y \]
     \[ t \]
     \[ R = 0.210034 \]

     \[ (1.87201) \]

(iv) \[ \log M_P = 0.148267 + 0.03347 \log Y \]
    \[ t \]
    \[ R = 0.000901 \]

    \[ (0.007558) \]

(v) \[ \log M_P = -0.099197 + 0.817988 \log Y \]
    \[ t \]
    \[ R = 0.32429* \]

    \[ (2.98857) \]

Values in the parentheses are t values.

* Significant at 5 percent level.
Where \( O \) is per capita output, \( Y \) is per capita income, and \( K \) is/cash-requirements. Subscripts stand for wheat, rice, maize, pulses and all food-grains. Main features of the above exercises are as follows:

(i) Co-efficient of correlation in case of cash is significant statistically only in one out of five cases. Elasticity estimated with respect to cash is significant only in one case while it has got positive sign for four cases out of five. Positive sign for cash elasticity implies that with the increased demand for cash, farmers sell a larger amount of produce. This seems to be true in present situation with the passage of time, there occurs an upward rise in the demand for cash due to inflationary trends or due to economic advancement. In order to fulfil their cash needs farmers are forced to sell larger quantities of their produce. Thus, these empirical results lend support to the hypothesis of positive relationship between marketable surplus and cash-requirement. 

In the second exercise, we have estimated the total elasticity of marketable surplus with respect to output. An important property of the curve is that it has the same constant value of elasticity at every point of estimated line. Main features of the output elasticities are as follows:
(i) Co-efficients of correlation and regression are positive and highly significant. As high as 55 to 92 percent of total variations in sales of different commodities are explained by changes in output.

(ii) Output elasticity is not only positive but it is greater than unity in case of wheat, pulses and all food-grains which means that marketable surplus responds more than proportionately to changes in output.

(iii) In case of income, coefficient of correlation is significant in one out of five cases. But changes in income account for only 11 percent of total variations in marketable surplus.

(iv) Income elasticities have got the positive sign as expected. Elasticity happens to be significant in one out of five. In case of rice, maize and all food-grains elasticity is quite high and reaches near to unity which means that marketable surplus responds less than proportionately to changes in income.

(v) Thus, output is more important determinant of marketable surplus of different commodities than income so far as sales behaviour of all farmers taken together is concerned. Hence, income does not emerge as important determinant as output. It is implicit that income is comprised of farm and non-farm income. A large part of
total income is derived from other sources than agricultural income. If only farm income is taken into account then the situation will be different. In case of data collected from HEC reports, we have tried to calculate the elasticity of marketable surplus indirectly. If one has estimates of income and price elasticities of consumption, elasticity of marketable surplus could be derived by the following formula:

\[ m = - (\beta - \alpha) \frac{c_f}{o_f - q_f} \]  

\[ \ldots (1) \]

We find that price elasticity from panel data is -0.596 and it lends an empirical support to the hypothesis of inverse relationship between price and marketable surplus.

In bivariate analysis, cash requirements and income have not emerged as significant determinant of sales behaviour of farmers. Therefore, we have not tried to estimate the elasticity for marketable surplus with multiple regression analysis. Thus, bivariate regression results lend support to following hypothesis:

(i) Cash requirements and marketable surplus are positively related due to inverse relationship between price and marketable surplus. Inverse relationship between the two is free of the assumption of fixity of cash requirements.
(ii) Marketable surplus is positively and highly related with output/income. The change in both the variables emerges in the same direction.

These results are in consonance with the results of Punia's data. In the study of Sunher village, we found positive and significant relationship between marketable surplus and output/income. In both the studies, output emerges as an important determinant of marketable surplus. Even these results are similar to those of Tripathi (44). In her study, output/income are positively related with marketable surplus. In both the studies marketable surplus is also regressed on cash-requirements. Results are similar in both the studies. But the only significant difference between the two is that in her study, for most of the families cash-requirements are found to be negatively growing, while in the present study, we find that for all the thirteen families, cash requirements are positively growing.